$$V_Y = \frac{\sum y_i^2}{N} - (\overline{Y})^2 = 0{,}32 \quad \text{d'où } \sigma_Y = 0{,}4 \cdot \sqrt{2}\,.$$

$$\text{cov}(x,y) = \frac{\sum x_i y_i}{N} - \overline{x}\ \overline{y} = 36{,}7 - 37{,}5 = -0{,}8$$

$$\rho_{XY} = \frac{\text{cov}(x,y)}{\sigma_x \sigma_y} = \frac{-0{,}8}{\sqrt{2} \cdot (0{,}4\sqrt{2})} = -1\,.$$

b) $\mathcal{D} : y = a\,x + b$ où $a = \dfrac{\text{cov}(x,y)}{V_x} = \dfrac{-0{,}8}{2} = -0{,}4$ et

$b = \overline{y} - a\,\overline{x} = 12{,}5 + (0{,}4)(3) = 13{,}7\,.$

Conclusion : $\mathcal{D} : y = -0{,}4x + 13{,}7\,.$

2°/ $\text{Log}\, z = y \Leftrightarrow z = e^y$ or $y = -0{,}4\,x + 13{,}7\,.$

Conclusion : $z = e^{(-0{,}4x+13{,}7)}\,.$

lorsque $x = 10 \Leftrightarrow z = e^{9{,}7} \approx 16317{,}60\,.$

Solution 6 :

1°/ $\rho_{ER} = \dfrac{\text{cov(E, R)}}{\sigma_E \cdot \sigma_R}$

on a : $\overline{E} = \frac{1}{5}\sum E_i = 70\,;$ $\qquad V_E = \frac{1}{5}\sum E_i^2 - (\overline{E})^2 = 200$

$$\sigma_E = \sqrt{V_E} = \sqrt{200} = 10\sqrt{2}$$

$\overline{R} = 44{,}16$; $V_R = 26{,}9784$ et $\sigma_R \approx 5{,}1941\,.$

$$\text{cov(E, R)} = \frac{\sum E_i R_i}{5} - \overline{E} \cdot \overline{R} = 3163{,}2 - 3091{,}2 = 72$$

d'où $r \approx 0{,}98$ donc la corrélation est forte.